1979 ENERGY STATUS REPORT

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TABLE OF CONTENTS

	Page
Introduction	1
Section I	
1979-80 Heating Season Fuel Availability Assessment	
Natural Gas	3
Electricity	4
Heating Oil	4
Section II	
Long Term Energy Supply Assessment	
Coal	6
Electricity	11
Natural Gas	15
Petroleum	19
Conservation	24
Alternative Energy Sources	27
Section III	
Data Tables	31
Section IV	
A-95 Review & Comments	59

List of Tables

Table	Title	Page
A-1	Comparison Between One Year of Actual and Forecasted Supply for Eight Major Ohio Gas Utilities by Source	31
A-2	Comparison Between One Year of Actual and Forecasted Demand for Eight Major Ohio Gas Utilities by Sector	32
A-3	Major Ohio Utilities - Net Generation by Type of Fuel (Ohio Portion)	33
A-4	Ohio Electric Utilities Projected Demand and Fuel Assessment, November 1979 - March 1980.	34
A-5	Domestic Distillate Stocks and Refinery Capacity Utilization	35
A-6	Projected Distillate Fuel Stocks for New England, PAD 2 and U.S., August 18 - October 26, 1979.	36
A-7	Distillate Fuel Oil Stocks, 1979 vs. 1978.	37
A-8	PAD. District Share of Total Distillate Fuel Stocks, Actual and Projected, June - October 1979	38
B-1	Coal Reserves in Appalachian States.	39
B-2A-D	Ohio Energy Consumption by Fuel, by Sector	40-43
B-3	Ohio Coal Use by Source, 1970-1978	44
B-4	Ohio Gross Energy Production by Fuel, 1970-1978.	45
B-5	Ohio Gross Energy Consumption by Fuel, 1970-1978	46
B-6	New or Expanded Ohio Coal Mines, 1978-1986	47
B-7	Ohio Utility Long-Term Debt Ratings, 1969-1978	48
B-8	Comparison of Utility Common Stock Prices to Book Value Per Share 1970 and 1978	49
B-9	Bonds and Preferred Stocks as a Percentage of Long-Term Capital for Ohio Electric Utilities, 1970, 1971-1975	50
B-10	Electric Generating Capacity Serving Ohio, 1975-1989	51
B-11	New Ohio Electricity Generating Facilities Proposed Through 1989	52
B-12	Ohio Resource Reserves by Fuel, 1970-1978.	53
B-13	Top Ranked Ohio Counties for New Gas/Oil Wells, 1978	54
B-14	Sources of Gas Supply for Ohio Gas Utilities, 1978	55
B-15	Average U.S. Gasoline Prices, 1973-1979.	56
B-16	Average Residential and Industrial Heating Oil Prices, 1974-1979	57
B-17	Ratio of Gross State Product to Ohio Energy Use, 1970 and 1978	58

INTRODUCTION

The Ohio Department of Energy (ODOE) is required by ORC 1551.04(E) to prepare an annual "Ohio Energy Status Report," for the Governor and the General Assembly. The report assesses Ohio's historic energy requirements, utilization and supply and provides estimates of current and future energy requirements. In addition, the report describes ODOE policy and program efforts to assure adequate future energy supplies for the State.

It is clear that the greatest immediate concern facing the State and the rest of the nation is the adequacy of petroleum supplies. Federal rules and regulations have preempted direct control by states over price and supply allocation considerations. ODOE's role is limited to administering certain delegated federal programs to ensure that petroleum products are available to satisfy Ohioans' health and safety needs. We will continue to carry out this responsibility.

The information discussed in this report demonstrates that the supply adequacy of several fuels will continue in question for the foreseeable future, while prices for all energy are certain to increase. ODOE believes that two concurrent courses of action are necessary to ensure adequate supplies of all forms of energy at the lowest possible price to Ohio consumers.

First, we must continue programs for development and increased utilization of Ohio's abundant indigenous energy resources, coal and natural gas. These resources can be more fully developed. Their proper utilization can provide the most reliable supply of these fuels at the lowest cost to Ohio consumers.

The second course of action is to promote conservation of all fuels to help Ohio consumers cope with the rising cost of energy. The people in Ohio and the rest of the nation developed extremely wasteful energy habits during the time when we had an apparently abundant supply of energy available at very low cost. That situation has changed dramatically. Today, all Ohioans must understand that energy is no longer so abundant as once believed and that the prices we will pay for energy will require larger and larger portions of our incomes. To help Ohio's people learn how to conserve energy most effectively and with the least inconvenience, ODOE will continue to intensify public education programs directed at energy conservation throughout Ohio.

This report is divided into four sections. Section I describes the near term outlook for natural gas, electricity and heating oil for the coming heating season. Section II presents a more strategic

overview of current and foreseeable Ohio supply and consumption patterns for coal, natural gas, petroleum products, electricity, and alternative fuels. Changes from historic trends are identified, as are the problems associated with utilization of each energy form, and the corresponding ODOE response efforts designed to resolve these issues. Section III contains the tables and statistical references from which the conclusions and suggested directions contained in Sections I and II are drawn. Section IV contains ODOE responses to comments received pursuant to A-95 review of the draft copy of this report. ODOE maintains an extensive energy data base far beyond the information contained in this report. Inquiries for more detailed information are invited.

SECTION I

1979-80 Heating Season Fuel Availability Assessment

On August 15, 1979, ODOE submitted to the Governor and the General Assembly a report which forecast the availability of natural gas and electricity for the coming winter. This section summarizes the information contained in that report and provides an overview of the near term energy supply projections relevant to Ohio consumers.

NATURAL GAS

With regard to natural gas, the report stated that there should be no user curtailments this winter from restricted natural gas availability, even in ten percent colder than normal weather. This conclusion was based on supply and demand forecasts submitted by gas utilities and compared with independently derived ODOE forecasts.

Ohio's natural gas utilities anticipate receiving 1,025,530 million cubic feet (MMcf) of natural gas for the period May 1979 to April 1980, or 2.3 percent more than for a similar period the year before. Of this amount, 94.3 percent will come from interstate sources. About seven percent of interstate supplies will be imported in the form of liquefied natural gas (LNG), while 3.7 percent will be synthetic natural gas (SNG) produced in Green Springs, Ohio. Table A-1 shows natural gas sources for the coming year compared with the past year.

An independent forecast done by ODOE projects a slightly higher demand for natural gas than that forecast by the utilities both under normal weather and ten percent colder than normal scenarios. Supply projections in either case appear adequate to meet demand.

This increased availability of natural gas supplies and user conservation has convinced the PUCO to allow the major natural gas utilities to begin connecting new customers. New connections are limited in that large boilers (300 MMcf/d and greater) can be added only as interruptible loads. New service connections will affect gas demand negligibly this winter. Their impact will be fully felt in the 1980-81 heating season, however. Table A-2 shows that with normal weather residential and commercial demand will decline from last year. This indicates the effectiveness of conservation programs.

ELECTRICITY

There will be an adequate supply of both generating capacity and fuels to generate electricity. The only foreseeable problem in adequacy of electric energy is the availability of fuel oil for peak load generation. Oil-fired generation usually provides about two to three percent of net generation during the heating season. Figure A-3 shows that oil provided twice the usual amount of generation during the coal miners' strike in early 1978, but returned to its normal consumption patterns by the 1978-79 season.

Table A-4 shows the volumes of fuel that utility companies anticipate to be delivered and burned during the next 12 months. These projections assume an adequate supply of oil. As stated below, oil supplies should be adequate for the coming heating season. However, if for some unpredictable reason, petroleum supplies are less than adequate or unavailable to utilities, electricity shortages could occur this winter during peak periods of demand. Such shortages would generally be localized and of short duration. ODOE has been working jointly with Ohio utilities and the PUCO to develop corrective actions for this potential situation.

Demand forecasts for the next twelve months afford some margin of safety. ODOE forecasts consumption to grow at a yearly rate of four percent over the coming calendar year. The residential and commercial sectors should grow at rates of six percent and seven percent, respectively. Industrial growth is forecast at three percent for the year. However, this forecast does not consider any near term demand reduction which could result from a depressed national economy. Consequently, actual growth rates, particularly in Ohio industrial electricity use, may not be as high as projected. A lower growth in electricity usage would have an effect on both base load and peak load requirements. Therefore, oil requirements may not be as high as projected. ODOE will report again on December 15, 1979, to the Governor and General Assembly specifically regarding the availability of oil and the recession effects on peak load generation requirements.

HEATING OIL

Ohio's heating oil supplies will be adequate for the coming 1979-80 winter. This conclusion is based on a comparison of current national and regional heating oil stock levels with those of

previous years. Pre-heating season oil inventory stock levels are important because users consume product faster than it can be produced during the winter months. Therefore, enough product must be in storage at the beginning of the heating season to balance the increased need for product with limited national refining capacity.

At the national level, attention has focused on primary stock levels, that is, stocks held at the refinery. Primary stock data does not consider secondary stock volumes held by "jobbers" (wholesale resellers), or tertiary stocks held by end users.

USDOE has set a nationwide primary stock level target of 240 million barrels by November 1, 1979. Table A-6 shows that, if heating oil production and storage increases continue at their current rates and usage follows last year's pattern, the 240 million barrel mark should be reached in mid-October. Demand has followed last year's demand pattern very closely to mid-September. This projection takes into account the possibility that, although the primary heating oil stock levels have been built-up to meet the USDOE target, secondary and tertiary stocks have not increased at historic proportions. The National Oil Jobbers Council suggests that 16 million barrels have been held at the primary level and have not moved through the distribution system to the secondary level as would usually happen at this time of the year. The primary national stock projections assume that the 16 million barrels will flow into the distribution system between now and November 1.

Table A-8 shows some variation among Petroleum Allocation for Defense (PAD) Districts in the rates at which stocks are building regionally. Ohio is part of PAD 2 (Figure 1). By mid-August, national primary stocks had reached parity with last year's primary stock level. However, PAD 2 stocks have not yet reached last year's level. Now that stocks have reached parity in other areas, PAD 2 stocks should begin to fill faster, as more product is routed to our District. Consequently, we believe that Ohio stocks should be at adequate levels by the onset of the heating season.

SECTION II

Long Term Energy Supply Assessment

COAL

Of Ohio's indigenous energy resources, coal offers the greatest potential contribution to future Ohio energy needs. Proven Ohio coal reserves, as shown in Table B-1, are 49.1 billion tons, or over 600 years supply at current Ohio usage rates.

Nationally, coal fueled America's industrial growth through World War II. Since that time, however, natural gas and petroleum have displaced a large portion of industrial coal use due to their relatively lower cost and easy transportability. Since World War II, most direct commercial and industrial users have switched to these fuels from coal. Today, as future petroleum and natural gas supplies become less reliable and more costly, coal is being reconsidered as a primary industrial and large commercial energy source. In Ohio, substantial potential exists to increase the use of Ohio produced coal, particularly in industrial boiler applications, thereby reserving the future availability of natural gas and petroleum fuels for residential and other small users' needs.

Coal currently accounts for 48 percent of total Ohio industrial direct fuel use. The difference in price between Ohio coal and other fuels from non-Ohio sources provides incentive for additional Ohio industrial and commercial users to switch to coal. In 1978, Ohio coal prices averaged $1.28/MMBtu compared to $2.24/MMBtu for natural gas and $3.50/MMBtu for fuel oil. Increasing prices and supply shortages of other fuels, coupled with the new federal Industrial Fuel Use Act of 1978, which requires conversion to coal, should provide clear market direction and incentive toward expanded coal use nationally and in Ohio. However, these federal incentives have not expanded the market demand for Ohio coal. In fact, current federal environmental regulations have severely curtailed demand for Ohio's typically high sulfur content coal.

The Clean Air Act of 1970 established national ambient air quality standards for sulfur oxides and other major air pollutants. The U.S. Environmental Protection Agency (USEPA) is responsible for the establishment of the measurement methodologies used to determine compliance with the Act. USEPA has elected to use computer models of Ohio air quality based on academic assumptions rather than actual field measurements to determine the degree of pollution abatement needed in Ohio. These models grossly overstate the real level of existing Ohio coal-burning emissions and harmful pollutants. The resulting USEPA regulations, designed to assure Ohio compliance with the Act, are based on this erroneous data and are therefore overly restrictive.

Most Ohio coal has a sulfur content of three percent or more.

Consequently, under USEPA fuel input or smokestack emission sulfur limits, less than five percent of Ohio coal can be burned in Ohio boilers without installation of very expensive pollution abatement equipment. Therefore, many Ohio coal users have had to begin using lower sulfur out-of-state coals.

While consumption of coal in Ohio has increased significantly since 1970, consumption of Ohio produced coal has declined dramatically from 35.6 million tons in 1970 to 30.7 million tons in 1978, as shown in Table B-3. Virtually all of this additional coal has been provided by imports from other states. Coal imports have increased from 31.8 million tons in 1970 to 37.2 million tons in 1978. Continuation of this trend of increasing coal imports and decreasing Ohio coal production will clearly result in less reliable future Ohio energy supplies and substantially higher consumer prices. ODOE believes this trend must not continue and that the enormous potential of Ohio's coal resource base must be permitted to provide the cornerstone of Ohio's energy future. To do so, technology to burn Ohio coal in an environmentally acceptable manner must be developed and made commercially available. This requires the expenditure of huge sums of money to demonstrate the feasibility of emerging technology. Secondly, federal air quality compliance timetables must be made compatible with a reasonable rate of commercial application by Ohio coal users.

Accordingly, ODOE will:

Continue to support research and development of technologies which permit the burning of Ohio coal in an environmentally acceptable manner. To do this we will support the passage of a coal tax to support these research, development and demonstration projects.

Since sulfur oxide emissions are the principal environmental problem associated with Ohio coal, ODOE must focus its attention on the development of sulfur removal technologies. Use of the newer technologies will allow usage of Ohio coal to increase unabated. Sulfur can be removed in post-combustion, during-combustion, or pre-combustion processes.

Nationally, post-combustion stack gas desulfurization or "scrubbing" is most widely touted as the best technique to achieve compliance with emissions regulations. In scrubbing, stack gases pass through a water and lime spray before entering the atmosphere. Sulfur reacts with the calcium in the lime, precipitating out as a sludge which is removed to a settling pond. Scrubbing devices have proven effective in cleaning emissions from low-sulfur "compliance" coal (coal already meeting emissions regulations). However, as sulfur content increases, the effectiveness of scrubbers decreases.

New developments in scrubber technology could improve performance. Experiments with desulfuring agents other than lime are being undertaken. Potential also exists for improvement in the operation of scrubber components. However, even with some technological improvement, stack gas desulfurization systems will remain operationally unreliable and expensive. It is ODOE's position that more economical, environmentally effective and operationally usable post-combustion sulfur removal technologies can and should be developed.

Pre-combustion cleaning of coal offers significant potential for making usage of Ohio coal environmentally acceptable. Current methods of physically "washing" coal can reduce sulfur content of the "dirtiest" Ohio coal by 40 to 60 percent. In 1977, 37 percent of Ohio coal was prepared in this fashion. More than 20 different Ohio coal washing processes were tried to find ways to remove organically bound sulfur. Chemical removal of sulfur, both pyritic and organic, shows more promise. It, too, is expensive, but potential for improvement exists. These relatively expensive pre-combustion coal treating processes will become economically attractive as the prices of alternative fuel such as natural gas, oil, and electricity increase.

There are other processes for pre-combustion treatment of coal. Pelletization and carbonization of coal-limestone mixtures can chemically bind the sulfur to the ash and produce a fuel pellet which can be burned directly or gasified. Coal liquefaction and gasification produce "de-sulfured" end products much different from raw coal which can be substituted for other fuels. Liquefaction produces a crude oil-like substance which can be refined in the same manner as petroleum. Gasification can yield either a low-Btu gas for direct burning in boilers or a high-Btu gas which can be placed in natural gas pipelines for commercial or residential use. Gasification and liquefaction will contribute to clean use of Ohio coal over the long term, but will not make any significant contribution to supply until 1990. However, research, development, and demonstration of such coal "conversion" technologies must continue at an accelerated pace.

The most promising near-term technology for use of Ohio coal is the fluidized bed combustion (FBC) boiler. In a fluidized bed boiler, coal is mixed with limestone and fed into the combustion chamber of a boiler. Air streams feeding into the chamber keep the coal and limestone mixture suspended in a turbulent state. As the mixture burns, the sulfur in the coal reacts with the limestone and falls out with the ash rather than escaping through the stack into the atmosphere. ODOE is currently sponsoring a demonstration of a commercial-sized FBC system at the Central Ohio Psychiatric Hospital. Construction should be complete in early 1980, with operation scheduled shortly thereafter.

Scaling the FBC boiler technology up to utility-sized capacity requires pressurization of the combustion chamber. The Electric Power Research Institute (EPRI), the National Aeronautics and Space Administration (NASA), USDOE, and a number of private firms are actively engaged in the design of a demonstration pressurized FBC system.

Development and installation of all these systems take time. Air quality emission regulations must allow the use of these techniques as they become available. Therefore, ODOE will:

Continue to seek reason and stability in federal environmental laws to allow time for technological development for direct combustion of coal in an environmentally acceptable manner.

The Clean Air Act requires ambient air quality standards be set by USEPA based on the best information available on the health effects of pollutants. In the early 1970's USEPA set strict, inflexible USEPA regulatory standards. Such arbitrary nationwide standards would make sense if the health effects of air pollutants were well-known, well-documented, and could be predicted with accuracy for all areas of the country. However, considerable substantive disagreement exists regarding how harmful coal-produced sulfur emissions are. New research data are only now coming to light. The Clean Air Act directs USEPA to refine continually its pollution control regulations based on the most up-to-date definitive information and research. It, therefore, appears premature for USEPA to continue to force upon all of Ohio very restrictive sulfur standards based on non-definitive or non-existent research data on the real effects of sulfur oxides.

Similar questions concern facility-specific or area-wide emissions limitations set to meet computer modeled ambient air quality standards. The best available methods of ascribing pollution to pollution sources must be used in determining health protective emissions limitations. USEPA computer methods currently in use systematically overstate the pollution actually generated by each source analyzed. Current USEPA methods estimate the air quality of stack emissions based on operation of a facility at full capacity, year-round. Such methods ignore the real operation of these facilities, which generally run at less than full capacity over time. The USEPA standards based on these computer methods create an unreasonable and unnecessary restriction on the use of coal in Ohio.

There is further question at this time as to the prescription of one technique as the best available technology to control emissions. USEPA believes there is only one technique: scrubbers. Evidence would indicate that there is presently an absence of any

commercially proven and operationally successful technique for removal of sulfur from high-sulfur coal or its emissions. Certainly there is no "best" technology today.

Large users of coal are faced with some tough choices in light of these regulations. They face doubly restrictive emission limitations which are based on overstated areawide emission load projections and overstated health effects. Currently, these users must choose from sub-optimal alternatives in meeting such unnecessarily restrictive standards. First, they may install emission abatement equipment of uncertain reliability and efficiency and extremely high cost. Secondly they may import low-sulfur coal to mix with high-sulfur Ohio coal. Finally, they may switch totally to higher cost low-sulfur out-of-state coal. Ohio coal users switching to out-of-state coal will seriously affect Ohio's economy through higher consumer prices and less available capital to invest in new job producing facilities. The Ohio coal industry, the major economic sector and employer in one-quarter of the state, will suffer seriously.

We believe environmental air quality regulations can be refined to minimize these adverse economic impacts with negligible effects. First, flexible standards can be set which do take into account reliable data on the health effects of emissions and potential economic impacts. Second, individual coal boiler emissions limitations can be based on real operating conditions. Permit specifications can restrict operation in excess of those conditions. Third, air quality control strategies can be refined to allow time for development of more effective and economic abatement technologies for installation by coal users without loss of competitive market position.

Within this context, on August 31, 1979, Ohio EPA submitted to USEPA a new Ohio sulfur dioxide control plan which is designed to bring Ohio into compliance with federal air pollution control standards by December 31, 1982, while permitting the continued usage of Ohio coal. During the interim period of USEPA review, the Ohio EPA plan will be in effect under Ohio law. The Ohio EPA regulations specify the use of actual field samplings of smoke stack emissions, rather than USEPA designed computer models.

Consequently, the Ohio EPA plan, by addressing the issue of what is actually emitted into the air from Ohio coal burning sources, should result in less restrictive coal use regulation while providing a more realistic measure of Ohio's ambient air quality.

The Ohio EPA plan will permit large coal users, such as utilities, to meet clean air requirements through pre-combustion coal washing and other sulfur removal techniques, rather than requiring post-combustion stack gas "scrubbers." As discussed

above, ODOE is actively involved in sponsoring the development and commercialization of several promising pre- and during-combustion coal cleaning techniques. These include pre-combustion preparation methods such as coal washing, solvent refined coal, and pelletization as well as combustion techniques involving the fluidized bed boiler. Ohio EPA's approach to specifying how an Ohio coal user may comply with national clean air standards should create immediate incentives for application of these sulfur removal techniques by Ohio coal users. Although USEPA still retains formal authority to require the more costly and less reliable "scrubbers," we do not believe it reasonable for them to do so. ODOE will support federal acceptance of Ohio EPA's plan.

ELECTRICITY

Ohio electrical generation capacity will be sufficient to meet demand into the early 1980's. However, Ohio utilities currently face difficulty in raising new construction capital which may adversely affect their ability to build the facilities needed to reliably serve consumer needs in the late 1980's and beyond. The paradox in planning current capital and future construction activities is that, while future annual consumer demand growth and therefore revenues will be lower than historically anticipated, consumer peak demands will continue to require construction of new generating capacity at substantially higher than historic costs.

Historically, Ohio consumer demand grew at seven percent annually through 1973. The average year-by-year growth in demand since 1974 has averaged less than five percent for each Ohio consuming sector as shown on Tables B-2A through B-2D. New generating capacity projected for service in the early 1980's was planned assuming the historic rate of seven percent demand growth. Therefore, ODOE projects that there will be adequate generating capacity in Ohio through the early 1980's, due in part to the reduced rate of demand growth.

The ODOE concern is for the long range time frame. Some of the existing plant and equipment is obsolete and/or inefficient and will have to be replaced. Additional generating and transmission capacity will have to be installed to meet the increased demand of an expanded Ohio economy. Such replacement and new facility construction necessary to serve Ohio consumers needs will require Ohio's electric utilities to continue their program of plant modernization and expansion.

To do so, Ohio utilities will need to begin very soon to raise huge amounts of capital. Lower rates of growth in consumption have meant utilities near-term revenue levels are lower than expected while the cost of future construction and interest rates have increased substantially.

In 1975, when Ohio consumption patterns began to change, debt already accounted for large portions of Ohio utilities' long term financing, as shown in Table B-9. Since 1975 Ohio utilities have been carrying historically high levels of fixed debt costs which must be paid for out of current revenues. Thus, when actual revenues do not meet anticipated levels due to conservation or a sluggish economy, earnings do not reach projected levels either. This causes investors to lose confidence in the ability of utility stocks to provide a satisfactory rate of return which lowers equity stock values while raising debt rates still higher.

Such diminished investor confidence substantially raises the cost of available capital for future plant construction. As old five to six percent utility bonds are retired, new 10 to 12 percent interest bonds must be issued in their place. Thus, Ohio utilities have to pay higher rates of interest for a diminishing amount of available money. Evidence of the effect of these factors is demonstrated in falling utility bond ratings and stock prices as shown in Tables B-7 and B-8.

Financing is not the only factor inhibiting Ohio utilities' ability to meet long term Ohio electricity needs. Regulatory lags, licensing requirements, and rapidly escalating construction costs also contribute to this problem. In 1970, the lead time for a coal fired generating plant was five years. Due to regulatory constraints, it now takes 10 years to complete a coal-fired generating plant and between 13 to 15 years to complete a nuclear generating plant. In recent years the construction cost per kilowatt of installed generating capacity has risen dramatically. Coal has been, and will continue to be, the primary fuel for generating electricity in Ohio as shown in Table B-10. Construction costs for a coal fired power plant installed in 1970 averaged about $350/KW. In 1978, this same facility cost about $1000/KW.

Current Ohio law prohibits a utility from including construction costs in the customer rate base until that facility is 75 percent complete. This means that a utility must pay all interest and principal charges on debt incurred for the facility for many years before these charges can be included in customer rates. In combination, these difficulties inhibit Ohio utilities' ability to maintain rates of needed new plant and facility construction to keep pace with Ohioans longer term electricity needs. Table B-11 shows additions to capacity planned by utilities for the next ten years.

These problems are the principal concern of utilities and the PUCO. However, when such problems affect the availibility of adequate Ohio energy supplies at a reasonable cost, they also concern ODOE. The resolution of these problems rests in timely rate relief and reduction of the utilities' need for capital investment.

Accordingly, ODOE will:

Encourage the development and adoption of load management techniques and investigate the feasibility of peak load pricing to reduce future peak requirements;

Continue to encourage investigation into ways to manage the generation of power to maintain reliable service at the lowest possible cost to the consumer; and

Support research and development into methods of reducing generator down-time.

Rate-setting is the purview of the PUCO. However, ODOE can help to investigate and promote some measures to reduce the utilities' need to add plant and equipment in the future. Two approaches can be taken to reduce the need to build new plant and equipment. First, the reliability of generation may be improved so that required reserve generating capacity levels--available equipment capacity needed for a margin of safety slightly over anticipated peak demand--may be reduced. Second, growth in peak demand may be reduced so that construction of new generating capacity may be deferred. Research is currently underway in both areas. Utilities and the PUCO are studying ways to reduce generator down-time--limiting both the number and duration of outages--thus improving generator reliability. Increases in reliability reduce the need for new expensive back-up generation equipment.

Currently, several Ohio utilities are involved in pilot projects to reduce peak demand generation needs. Two techniques are being investigated: 1) load control--actual physical control over consumer appliances which use electricity at peak periods; and 2) peak load pricing--special consumer rates which charge higher unit prices for electricity used during the peak. The principle involved here is that much of the additional cost associated with expensive peak load generation equipment should be passed on to those customers whose electricity needs contribute to the peak demand.

The Rural Electric Cooperatives, which form Buckeye Power Company, have instituted a load control program. Buckeye Power shuts off residential water heaters by radio control during peak demand periods. Buckeye's participating residential customers receive correspondingly lower rates. The program has proved effective, as Buckeye now anticipates a 137.4 megawatt reduction in

customer 1989 peak demand load. Dayton Power and Light (DP&L) is presently planning a similar program. In its 1979 Ten Year Forecast submitted to ODOE, DP&L projected a customer peak demand reduction of 677 megawatts or 16% from their earlier forecasted 1989 peak load. The DP&L estimate is, of course, preliminary and will be recalculated as soon as better information is available on the results of this load control program. Cincinnati Gas and Electric Company and the Cleveland Electric Illuminating Company are experimenting with peak load pricing on a limited basis. No formal results are available as yet. ODOE will monitor the results of these peak load reduction programs and present its view before the PUCO, if necessary, to promote appropriate changes in future rate designs or tariffs.

ODOE will also support additional research and development into means to:

Encourage, through adoption of more favorable regulatory treatment, innovations which reduce long term utility capital needs.

A change in regulatory treatment of utility research and development expenditures to provide near term fiscal incentives for reducing long term capital needs would encourage utilities to put more funds into such innovations. For example, the peak load reduction projects mentioned above could be considered capital-reducing research and development.

Any business or industrial firm which undertakes research and development does so to earn a future monetary return. Regulation of utilities only allows a rate of investment return on plant and equipment. Utilities have accordingly invested mainly in innovations which would increase plant and equipment. However, as problems in raising capital increase, utilities must find more innovative ways to provide reliable service to their customers.

Additionally, under current regulation, utilities generally find little incentive to perform other kinds of research and development. Current regulatory treatment only allows for a dollar for dollar reimbursement for research and development and operating expenses, unlike dollars invested in new plant or equipment. Therefore, Ohio utilities have no immediate incentive to undertake research and development from which they can earn no return. Accordingly, ODOE in cooperation with PUCO will look into how changes can be made in Ohio utility regulation.

In the private sector, competition tends to cause competing firms to find ways to reduce costs. To a limited extent the same is true of regulated utilities. ODOE is interested in fostering competition which results in reduction of future utility capital

requirements. ODOE believes that opportunities do exist for beneficial competition among all types of utilities and for developing electricity user co-generation. Combined with regulatory incentives for capital-reducing research and development, competition may have an impact on need for capital. It is not clear at this time to what extent encouraging competition in such narrowly defined areas can accomplish this, so ODUE will initiate further investigation in this area, and will:

Investigate methods of introducing competition for stimulating Ohio utility adoption of less capital intensive hardware and technology.

NATURAL GAS

The passage of the Natural Gas Policy Act of 1978 (NGPA) has had a significant effect on the availability and price of natural gas in Ohio. Previous federal regulations created disparity between the wellhead price of interstate and intrastate produced natural gas. Intrastate natural gas was not regulated by the federal government. The price of the regulated interstate natural gas was fixed. As general market prices rose above this regulated price, more and more newly produced natural gas was directed to the intrastate market where it could be sold at the prevailing market price. States, like Ohio, which rely on interstate pipeline supply experienced shortages because the new natural gas was being used in the intrastate system. Since only about 10 percent of Ohio's consumer requirements is produced within Ohio, (see Table B-14) interstate pipeline deficiencies had a particularly severe impact on Ohio. Consequently, the very cold winters of 1976 and 1977 resulted in severe curtailment of Ohio industrial natural gas supplies since there was insufficient natural gas supply to satisfy the total industrial demand and still meet the health and safety needs of Ohio consumers.

The NGPA extends federal regulation to intrastate natural gas. This will result in more natural gas being available to Ohio on the interstate market, although at a somewhat higher price. NGPA should also encourage increased drilling activity in Ohio. While 2,606 new wells were drilled in Ohio in 1978, 1,900 new Ohio wells were drilled during the first six months of 1979.

Nevertheless, some uncertainties still remain. In 1978, 65 percent of all Ohio residential energy use and 54 percent of commerecial use was natural gas, mostly for space heating, cooking and hot water. Natural gas also provided 26 percent of Ohio industry's energy needs in 1978. Ohio industrial energy dependence

on natural gas was 34 percent in 1972 prior to the curtailment of substantial industrial boiler fuel use and large scale shifting of industrial demand to fuel oil. Consequently, it is clear that all sectors of Ohio's economy are dependent on continued and reliable supplies of natural gas.

The PUCO has estimated that natural gas supplies will be adequate to meet Ohio demand at least through 1985. However, this estimate assumes no winter weather more than 10 percent colder than normal. It also assumes the continued availability of liquefied natural gas (LNG) from Algeria and other foreign sources, which have historically demonstrated instability in pricing and delivering contracted oil supplies. Further, the estimate does not consider the possible effects of "incremental pricing" under NGPA, which attempts to shield the residential consumer from higher natural gas costs by assigning the cost of higher priced new natural gas only to industrial users. In so doing, NGPA could cause residential natural gas demand to artificially expand to a level much higher than if the full cost of new natural gas supplies were passed through to all consumers. No one yet understands to what extent "incremental" pricing will change Ohio natural gas usage patterns.

Overall, the extension of federal controls and regulations under NGPA to Ohio natural gas production appears to be a mixed blessing. In the short-run, NGPA should expand Ohio natural gas drilling activity and increase interstate supply availability. In the long-term, there remain some unanswered questions. To provide for a more certain and reliable future natural gas supply to all Ohio consuming sectors, ODOE will:

Work within Federal Energy Regulatory Commission (FERC) and PUCO procedures to ensure that Ohio natural gas distribution utilities' supply sources are the most secure and reliable available; i.e., Ohio sources will be encouraged over out-of-state sources.

Because ODOE is concerned about the adequacy and reliability of future Ohio natural gas supplies from interstate and foreign sources, ODOE will continue to give priority attention to development of short and long term natural gas supplies from Ohio's natural gas reserves.

Both FERC and PUCO periodically review utilities' purchases of natural gas for resale. Such proceedings offer them and ODOE an opportunity to promote increased reliance on intra-Ohio produced natural gas. In a recent Columbia Gas of Ohio case, in which Columbia requested lifting of the ban on new service connections, PUCO mandated that new customers be served in part by Ohio produced natural gas. ODOE supports this decision and will enter future proceedings, seeking regulatory requirements that Ohio utilities

puchase more Ohio produced natural gas.

Not only is Ohio produced natural gas a more reliable supply source for meeting the increasing needs of Ohio consumers, but in most cases it is the least costly additional supply available. Therefore, ODOE will:

Promote the substitution of Ohio natural gas for higher priced natural gas being rolled into pipeline supplies.

Several factors still constrain increased production of Ohio natural gas and the provision of total consumer needs it fulfills. Currently, Ohio distribution utilities receive large quantities of interstate natural gas supplies for distribution to Ohio customers. Since distribution utilities are also the largest single purchaser of Ohio natural gas, Ohio producers must price their production competitively with interstate natural gas. The price of interstate natural gas includes the price of old and new natural gas. The new natural gas is priced very high, but it also includes natural gas acquired under older contracts which is much lower in price. Interstate pipelines sell this interstate natural gas to distribution utilities at a price which averages all these prices together. Thus, Ohio natural gas must compete against a lower average price.

Ohio gas could be made more fairly competitive if FERC would allow intrastate natural gas to be substituted for high cost interstate natural gas while rolling in the lower price. ODOE will monitor FERC and PUCO proceedings to see that such competitive equity is afforded to Ohio-produced natural gas. When an opportunity arises to seek this substitution with roll-in pricing, ODOE will enter these proceedings with this objective in mind.

To increase the flow of Ohio-produced natural gas to Ohio consumers additional pipeline capacity must be provided to transport natural gas from the producing wells into the utilities' distribution systems.

One existing constraint to increased production and utilization of Ohio's natural gas resources is the availability of gathering line and transport pipeline capacities. Deficiencies in transport capacities exist in several natural gas-producing areas of the state which is inhibiting increased production. These deficiencies must be corrected.

Legislative action, PUCO regulatory actions, or a combination of both may be necessary to provide Ohio utilities with incentives to construct new gathering lines and transmission pipelines. ODOE will continue to seek out and promote appropriate methods to encourage this development. Accordingly, ODOE will:

Emphasize development of additional transport and gathering line capacity to serve expanded Ohio natural gas production areas.

Historically, the greatest difficulties in recovering more Ohio natural gas have been economic and technological. With the higher prices now available for natural gas, the economics of deeper drilling and recovery technology are now more favorable in Ohio.

New technology can significantly increase Ohio natural gas production from traditionally produced formations such as the Clinton Sandstones. Current production, which now supplies about 10 percent of Ohio's needs, could be increased to about 20 percent. Increased prices allowed by NGPA make it economical to keep the producing wells in operation for a longer period of time. They also help to offset the cost associated with new producton techniques, such as enhanced recovery and in-field drilling. A further benefit of NGPA price levels will be the extension of production time before an individual well's maintenance costs exceed the economic return on production.

In order for Ohio's natural gas production to be significantly increased--possibly tripled--a new resource base other than the Clinton formation must be utilized. Devonian shale, which underlies much of Ohio, has the potential to be this new source. The U.S. Geological Survey estimates that these shales contain at least a 25 year recoverable natural gas supply for the eastern half of the United States. If present estimates are correct, making the shale an operational reservoir would increase Ohio's natural gas resource base from about 1.2 trillion cubic feet to at least 30 trillion cubic feet. This can make a very significant long-term contribution to the Nation's as well as Ohio's energy needs.

ODOE is currently involved in several research projects to discover methods to produce economically natural gas from Devonian Shale and similar tight Ohio geologic formations. One promising technology is fracturing where a fluid mixture (water, gel, etc.) is pumped into a formation, under pressure, to form cracks in the rock, thus forming conduits for the trapped natural gas to flow to the well bore. Fracturing methods being evaluated in shale include cryogenic, dendritic, explosive and massive hydraulic fracturing. These are all ways of artifically increasing the effective drainage area of a well bore. These techniques can significantly increase a well's daily production--both the production rate and years of economic life. ODOE will:

Continue to support research and develoment aimed at increasing natural gas production in Ohio by making existing wells produce longer and by applying new recovery techniques to Ohio's untapped natural gas reserves.

While the relatively shallow Clinton and Devonian shale formations (2,000-6,000 feet) will continue to provide the bulk of near term Ohio production, recent ODOE supported research reveals that substantial additional natural gas exists in the deeper formations (4,500-7,000 feet) in Ohio.

Underlaying the entire offshore Lake Erie area are "deep" reservoirs which are as yet essentially untested. These higher pressured deep reservoirs are believed to contain large amounts of both natural gas and oil not included in the projections of Ohio proven reserves. The U.S. Corps of Engineers is currently preparing an Environmental Impact Statement to assess the impact of drilling activities in Ohio's coastal areas.

With respect to the longer-term, Ohio should have adequate natural gas supplies as the relatively less costly and more reliable Ohio natural gas reserves are made available to Ohio consumers. ODOE will continue its efforts to encourage expeditious development of all new Ohio natural gas supply sources. Therefore, ODOE will:

Examine state laws and regulations governing exploration and production of natural gas, particularly the reserves in Lake Erie, and work to streamline these statutes and rules.

Sections 1509.01 through 1509.99 ORC relate to the exploration and drilling for oil and natural gas in Ohio. In the coming year ODOE will identify specific modifications needed to allow for increased natural gas exploration, development, and production, without any relaxation of environmental protection and other necessary standards.

PETROLEUM

The international nature of the petroleum supply and distribution network ties Ohio's petroleum future to factors beyond direct control of Ohio consumers. The nation is heavily reliant on foreign oil supply sources and this reliance is increasing at an alarming rate. At the time of the 1973 OPEC embargo the United States was importing about 30 percent of its crude oil requirements at a cost of $3.50 to $5.00 per barrel. Today, the nation imports nearly half of its requirements from foreign sources at a price of $23.00 per barrel for crude oil under long term contract and much more for spot purchases. In the space of six years, we have nearly doubled our dependency on foreign oil while the price has increased fivefold.

Paradoxically, while dependence on these foreign sources increases, the United States is confronted with decreasing delivery reliability. Oil producing nations have recognized the strong influence they have over American economic and security interests and from time to time they have seen fit to exert this influence in furtherance of their own ends.

Domestically, the federal government has responsibility for regulating the equitable allocation, distribution, and pricing of available petroleum products. During the summer of 1979, the combination of foreign supply cutbacks, domestic refining and distribution constraints, ineffective federal allocation regulation laws inhibiting domestic production, and the unwillingness of the American public to modify their driving habits created a mild gasoline shortage. This minor supply shortfall caused the allocation of heating oil and transportation fuels, restricted operating hours for gasoline stations, resulted in long lines at the gasoline pumps and forced cutbacks in personal discretionary driving. Such shortages, of increasing frequency, remain a continuing prospect unless and until the federal government takes strong action to reduce our national dependency on foreign supply and provides significant additional incentives to increase domestic energy production of all types.

To date, federal policy, though well-intended, has been at best confused, unclear, and inconsistent. Here are some eminent examples:

- During the recent cutback of production from Iran and its subsequent impact on domestic petroleum supplies, federal policymakers continued to direct needed crude oil from the consumer market into Strategic Petroleum Reserve (SPR) storage. If this stored crude oil had been needed to relieve more serious supply shortfalls it would have been inaccessible since the USDOE had neglected to install the pumps necessary to withdraw it from storage.

- Oil from the North Slope of Alaska was long touted as the panacea to domestic supply difficulties. Federal policy has prohibited export of Alaskan oil. The federal government has failed to expedite licensing of needed transmission pipelines in order to distribute the Alaskan crude to midcontinent and the east coast where it is needed. Consequently, Alaskan crude production is now running at significantly less than 100 percent of capacity while foreign imports continue to increase.

- The President and USDOE frequently issue statements deploring the continued heavy national reliance on foreign petroleum supply sources. At the same time the federal

will have immediate impact in this sector. For this reason the relatively minor shortages of gasoline and diesel fuel which occurred this summer could have had potentially severe consequences. Fortunately, Ohio consumers acted prudently in the face of these shortages and adapted well to the situation. Ohioans experienced no major employment disruptions nor did they suffer any significant economic hardship as a result of these shortages. There were relatively few lines at the gasoline pumps and none of the usage or sales restrictions employed in other states had to be used in Ohio.

Throughout this period of shortage Ohioans clearly demonstrated that they can live and work successfully while using less gasoline. In fact, gasoline consumption in Ohio has decreased seven percent during the first six months of 1979 as compared to 1978. ODOE believes that it is possible to reduce the demand for gasoline even further without adversely affecting Ohioan's life styles. Therefore, we will work to help Ohioans fulfill their work related and personal transportation needs while reducing further the amount of gasoline required to accomplish these tasks. A concomitant benefit is that Ohioans will have to dedicate a lesser portion of their income to satisfy their fuel needs.

ODOE efforts will concentrate on decreasing the amount of gasoline used by Ohioans in traveling to and from work. Commuting now represents 23 percent of Ohio's transportation fuel use and much of the gasoline used for this purpose is needlessly wasted. The majority of cars in any rush hour traffic-jam are occupied by the driver only. Many of these drivers have started their trips from the same general area and they are bound for the same general destination area. These drivers should be encouraged, through various incentives, to participate in ridesharing programs. Such incentives can come from the work place in the form of flexible work hours, preferential parking, etc. and/or through public education programs designed to highlight the cost savings benefits which accrue to individuals who rideshare.

To this end, ODOE will continue its active program to enlist employers' support in marketing various ridesharing actions. In order to promote ridesharing ODOE will sponsor seminars, visit places of business, support demonstration projects, and design local activities to increase ridership interest.

Public transit usage can also be substituted for individual commuter trips. ODOE will focus directly on the individual commuter through the mass media. ODOE will also emphasize reduction of fuel use by businesses and public agencies which have relatively large vehicle fleets through education and incentives to their employees.

Another method available to ODOE to increase supply reliability

is to support development of Ohio's indigenous resource base. Therefore, ODOE will continue to:

Encourage additional production from Ohio's traditional oil bearing formations, shales, and coal.

The synthetic fuels program proposed by the President could make Ohio's vast coal and shale deposits a major source of synthetic petroleum. There are also significant untapped oil deposits in northwestern Ohio. In the nineteenth century substantial oil production came from this region, however, the methods then used left most of the crude in the ground. The internal pressure of these remaining deposits is too low for economic recovery with existing production methods. Development of advanced recovery methods as proposed by the President could make these Ohio formations another source of domestic oil. These formations are estimated to hold economically recoverable reserves of over one billion barrels. ODOE will continue to monitor development of new technology in this area and, where appropriate, sponsor research to encourage its application to Ohio petroleum production.

CONSERVATION

Conservation is of high priority importance to Ohio because it:

- Reduces reliance on foreign sources of petroleum and other insecure sources of energy from outside the State;
- Relieves upward pressure on energy prices and is therefore beneficial to Ohio consumers. Ohioans annually spend about $10 billion on energy. Five percent overall conservation by Ohioans, an easily achieveable goal, will result in $500 million savings to Ohio consumers;
- Reduces need for growth in energy supplies from Ohio's traditional sources, thereby providing additional time for development of new Ohio energy sources; and,
- Saves capital investment funds of energy suppliers and consumers which can be redirected into other economically more productive job-creating ventures. These funds can also be routed into expanded energy research and development for renewable Ohio energy supplies.

As energy prices began to rise at an increasing pace during the

early 1970's, the American economy had to adjust to using less energy to produce the same output. Ohio's industrial sector responded quickly to this changing energy situation by increasing its energy usage efficiencies. Even without adjusting for recession in 1974 and 1975, it is clear that Ohio industry is producing more with less energy consumption. This increased energy efficiency of Ohio industry has been one of the principal contributors to the increase in average employment of 198,000 jobs in Ohio during this period.

Over the past few years the "know how" of energy conservation has come into its own. The need now is to disseminate this conservation knowledge and to give impetus to all Ohio energy consumers to use it. Significant further improvements in energy efficiency can be made, particularly among Ohio's commercial, residential, and other small users. ODOE believes that the average Ohio family can save $100 to $200 annually on fuel bills with little investment and no inconvenience.

ODOE has learned through experience that simply demonstrating that a conservation technology or technique is energy and money saving does not assure that it will be adopted by users. Further efforts are needed to "market" conservation techniques best suited to Ohioans. Accordingly, ODOE will further increase efforts to disseminate the most cost-effective proven energy conservation methods to Ohioans. ODOE will:

Expand public education and direct assistance efforts to encourage residential and commercial small energy users to adopt low-cost, quick pay-back methods of reducing their energy consumption.

Low-cost, quick pay-back conservation methods offer the greatest savings potential for Ohio homeowners and small businesses. Small users are often unable to make substantial capital investments in energy-saving home and building improvements, even if the rate of return is potentially large.

Residential and other small users can adopt low-cost conservation methods easily and quickly with proven assurance that the result will be an immediate reduction in fuel bills. ODOE will undertake to assure the availability to each small user of an impartial "energy audit" analysis of his home or building. This audit will identify for him the most cost-effective dollar-saving conservation actions he can take.

For both large and small users, ODOE will seek the assistance of organizations which broadly represent Ohio's consuming sectors. We believe working with the representative groups is the best approach to promote conservation. Such groups have an established rapport

with their constituents and understand their energy use patterns and savings potential. However, no organizations represent all Ohio residential and small commercial users. This further supports the need for ODOE to provide direct technical assistance to small users.

Governmental agencies have particular responsibility to demonstrate to the consuming public that it is possible to reduce energy consumption with no loss of public services. Therefore, ODOE will:

Continue to coordinate state agency efforts to reduce energy consumption in state government.

Reducing energy consumption at the state government level will assist in promoting conservation to Ohioans by showing that it works; that it is painless; and, that it saves dollars. For example, efforts to reduce state vehicle gasoline usage have already saved approximately $300,000 in taxpayer dollars and made more than 200,000 gallons per month available to the Ohio motoring public.

In the private sector there are numerous examples of other programs which have achieved significant energy savings. Information about these programs can be very useful to other energy users. To facilitate this sharing of conservation information ODOE will:

Provide a clearinghouse for development, dissemination and adoption of new conservation techniques which use energy more efficiently and encourage their adoption by Ohio users.

For these larger Ohio users, ODOE expects to serve as a gatherer and provider of information. Methods may be in use in other parts of the country which can be made available to Ohio industry. ODOE may go so far as to "sell" these ideas to industry--convince them that the benefits are worth their while. However, the variety of industrial processes in Ohio precludes ODOE from providing direct technical assistance to industry. In this role, ODOE need not undertake any research of methods, but merely make available to Ohio industry information about what is already being done by industrial users elsewhere. ODOE's role, therefore, in industrial conservation will be as a mechanism for conservation technology transfer and "clearinghouse."

Development of advanced energy utilization technology has rapidly changed the "state of the art" of what is available to Ohio consumers. While ODOE has neither the funds nor the staff to fully support major research and development efforts into such new methods, ODOE will assist Ohioans in promoting conservation ideas which are technically sound and particularly suited to Ohio users.

ALTERNATIVE ENERGY SOURCES

While increasing supplies from traditional Ohio energy sources and practicing conservation in their usage is essential, it is also necessary to step-up the application of non-traditional or "alternative" energy sources to meet Ohio's future energy needs. To ensure that such alternative sources do make their potentially significant contribution to Ohio energy consumers, ODOE will:

Continue active support for expanded development and application of solar, wind, biomass, and gasohol energy in Ohio.

Energy derived from alternative sources will provide an increasingly larger portion of Ohio's energy supply in the future. Solar, wind, and biomass conversion are already proven technologies at the present time. However, initial capital cost, consumer acceptance, federal government indecisiveness, and some technical deficiencies have hampered their widespread commercial application in Ohio. The cost of alternative energy supply technologies must be more competitive with the costs of traditional sources before Ohio consumers will have any incentive to adopt these newer technologies.

Costs associated with active solar space and water heating for Ohio residential use may be compared to the cost of electricity currently available for the same purposes. Costs for solar water heating are 5¢/kwh while Ohio's electricity costs ranged from 3.4 to 5.1¢/kwh. Direct solar conversion for space heating costs are 8 to 10¢/kwh. Solar water heating then makes sense now for Ohio consumers, while solar space heating will not be competitive for some time.

Even though annual costs may be comparable between an old and a new technology such as solar, consumer adoption also depends on the opportunity costs associated with abandoning older equipment which has not reached the end of its useful life. To maximize solar application rates, financial incentives in the form of income tax credits have been provided at both the state and federal levels.

Additional incentives can also be offered to residential homeowners installing new energy sources on-site. Property tax exemptions for solar equipment, further income tax relief and/or mortgage "add-on" capital cost are possible additional incentives. Financial incentive for builders of residential dwellings, and increased use of solar systems in State and Federal buildings may also be warranted. Electric utility rate modification for all

electric homes and buildings partially provided by solar or on-site wind systems should be explored. Because there are no "inexpensive" electric storage systems, virtually all present and foreseeable alternate on-site electric technologies require additional utility-provided power.

Current costs for wind-generated electricity for Ohio residential users is much higher than the price for conventional residential fuels. Although large scale wind energy conversion systems are currently available, only five of these turbines are commercially active in the United States, and all are of a demonstration nature. These turbines have proven that the cost of electricity produced decreases with increase of turbine size and higher wind speed. NASA estimates a 200KW turbine can produce electricity at costs of 8¢ to 10¢/Kwh in winds of 12 to 18 mph. Electricity from a 3000KW turbine in North Carolina already competes in price with electricity from the local utility there. Since larger turbines have the potential to produce at much lower cost, wind systems are more attractive from an operating cost standpoint.

A major constraint on the widespread adoption of this energy source is that wind systems must have large scale storage capacity associated with them to assure sufficient uninterrupted supply during periods of low or no wind conditions. In Ohio, there are very few sites of sufficient wind speed and constancy, as well as other necessary siting characteristics, to expect significant expansion in Ohio wind-generated electricity in the near future.

Electricity and fuels derived from biological materials, or "biomass" will become increasing contributors to Ohio's long-term energy needs. Several solid waste fuel fired municipal power plants are already operating or planned for construction in Ohio: Akron is presently generating steam; Columbus is building an electric generating plant; Cleveland and Toledo are designing a plant; Lorain is studying the feasibility of a generating plant. The estimated cost of electricity to be produced at the Columbus plant using a fuel mixture of 80 percent waste refuse, 20 percent coal off/peak, and 50/50 percent on/peak will be competitive with conventionally generated electricity when decreased landfill costs are considered. Electricity derived from other biomass, such as wood or plant fiber, is not generally economic. However, direct burning of these materials as industrial fuel for heating purposes may be feasible in some instances such as wood waste at a paper-pulp plant. In addition, botanical fiber, e.g., agricultural crop residue and animal manures, may be converted into usable fuels through biodigestion or distillation processes. Therefore, ODOE will continue to:

Support the development of grain produced alcohol and other energy reduction or conservation programs for farming operations.

Ethanol derived from agricultural material can be used directly by farmers to reduce agricultural consumption of expensive petroleum products. Either on-farm or small regional production facilities, which could be less capital-intensive than large-scale plants, can make near term contributions to Ohio agricultural energy needs. Governor Rhodes' "Task Force on Gasohol" has recommended development of such facilities. The derived ethanol, which may be distilled from distressed, damaged, or diseased grains, may be immediately used as fuel; i.e., blending with gasoline is unnecessary. By direct substitution, the ethanol produced would displace a proportional amount of petroleum product for use in other sectors. Fuel transportation and distribution costs associated with these decentralized rural facilities would be minimal.

Direct production of methane from animal waste will become more attractive in the future. Anaerobic waste digesters producing methane gas are used in many parts of the world as primary fuel production facilities for small farms. Already municipal sewage plants in large Ohio cities provide much of their operating fuel needs from sewage "digestion" gases. As the cost of traditional fuels increases, the time and capital investment necessary for rural small-scale on-site utilization of this technology will become more attractive, especially in intensive livestock-rearing operations. Agricultural application of this technology in Ohio will also have the benefit of limiting adverse feedlot runoff, a major environmental problem, while making Ohio farmers more energy self-sufficient.

To assure that the new technologies most appropriate to Ohio energy users needs are developed and made available for their application, ODOE will:

Support and, in some cases, provide financial assistance for development of alternate energy technology on the basis of technical feasibility and potential contribution to Ohio's energy needs.

Timely development and consumer adoption of solar, biomass, gasohol and other alternative technologies will not occur without some active governmental support. However, ODOE believes that the role of state and federal government should be limited to provision of gentle nudging incentives and provision of assistance upon request. Government should not impose technology forcing standards and regulations. The future energy needs of consumers simply will not be met if government tries to arbitrarily determine "the best available technologies" as it has done in the environmental protection area. ODOE believes that private sector innovators, whether developers, vendors, or users, must themselves determine each individual technology's optimal path and rate of development, production and application.

Assistance for alternative energy projects will be based upon the technical feasibility and the willingness of the developer to assume the financial risk incurred. As a participating member of the Mid-American Solar Energy Complex (MASEC), ODOE is already involved in the review and development of such projects, and will continue to urge the federal government's adoption of a rational alternative energy technology assistance program. The advent of the proposed national Solar Energy Bank may provide such an opportunity.

ODOE will continue its active role in dissemination of information, consumer referral, and technology transfer. Further, ODOE will continue active support of state legislation which encourages use of alternative technologies.

With respect to already proven technologies such as solar water heating for homes and buildings, ODOE efforts will be directed to augmenting public information programs to further encourage consumer acceptance and application. Ohio consumer acceptance hinges on cost, payback potentials, reliability, and regulatory treatment. Removal of consumer doubts will be ODOE's objective.

SECTION III

Data Tables

Table A-1 Comparison Between One Year of Actual and Forecast Supply for Eight Major Ohio Gas Utilities by Source (MMCF)

MO/YR	COLUMBIA GAS	CONSOLID-ATED GAS	LAWREN-CEBURG	MICH. MISC.	PANHANDLE EAST	TENN. GAS	TEXAS EASTERN	TEXAS GAS	EMERG GAS	OHIO PRODUCT	SNG	STORAGE/ PROPANE	OTHER	TOTAL SUPPLIES
5/79	30074	25275	128	80	4706	150	510	17	0	4044	2324	153	40	68301
5/78	27357	22266	81	63	5378	0	576	15	68	4640	2321	193	112	63070
	9.9%	13.5%	58.0%	27.0%	-12.5%	999.9%	-11.5%	30.8%	-100.0%	4.4%	0.1%	-20.7%	-64.3%	8.3%
6/79	22802	18562	124	65	4459	146	540	11	0	4853	1828	153	15	53638
6/78	17938	16379	113	66	5360	0	567	7	66	5310	1826	133	-169	47596
	27.6%	13.3%	9.7%	-1.5%	-16.8%	999.9%	-4.8%	57.1%	-100.0%	-8.6%	0.1%	15.0%	108.9%	12.7%
7/79	19922	16066	128	50	4538	146	560	10	0	4867	1633	153	35	48108
7/78	16690	13720	179	54	5122	0	538	6	35	5222	1632	129	11	43337
	19.4%	17.1%	-28.5%	-7.4%	-11.4%	999.9%	4.1%	66.7%	-100.0%	-6.8%	0.1%	18.6%	218.2%	11.0%
8/79	20240	15584	128	55	4578	145	560	10	0	4873	1662	153	12	48001
8/78	21167	14091	120	58	5406	0	510	7	43	5324	1660	140	180	46707
	-4.4%	10.6%	6.7%	-5.2%	-15.3%	999.9%	9.8%	42.9%	-100.0%	-8.5%	0.1%	9.3%	-93.3%	-1.4%
9/79	22065	18468	124	60	4502	144	520	17	0	4859	1796	153	-5	52703
9/78	19914	14189	141	57	5498	139	426	8	0	5936	1795	116	-225	47993
	10.8%	30.2%	-12.1%	5.3%	-18.1%	3.6%	22.1%	112.5%	0.0%	-18.1%	0.1%	31.9%	97.8%	9.8%
10/79	33887	25140	129	100	4881	147	500	23	0	4888	2473	153	3	72324
10/78	33397	23386	107	112	5960	152	561	18	39	5539	2399	144	-272	71614
	1.5%	7.5%	20.6%	-10.7%	-18.1%	-3.3%	-10.9%	27.8%	-100.0%	-11.8%	3.1%	6.3%	101.1%	1.0%
11/79	48994	17950	104	140	4924	152	510	36	0	4831	3643	12014	-23	93305
11/78	41516	19707	42	126	5672	123	550	25	0	6211	3640	6277	402	84291
	18.0%	-8.9%	147.6%	11.1%	-13.2%	23.6%	-1.8%	44.0%	0.0%	-22.2%	0.1%	91.4%	-105.7%	10.7%
12/79	67238	23996	77	175	5280	155	660	41	0	4875	4785	18788	-32	126038
12/78	60275	19604	42	171	6161	136	521	39	0	5745	4403	19657	862	117616
	11.6%	22.4%	83.3%	2.3%	-14.3%	14.0%	26.7%	5.1%	0.0%	-15.1%	8.7%	-4.4%	-103.7%	7.2%
1/80	76381	30456	77	180	5325	156	620	40	0	4989	5095	17511	-24	140854
1/79	80799	37264	23	202	6169	139	605	55	0	5365	5091	16116	-87	151740
	-5.5%	-18.3%	234.8%	-10.9%	-13.7%	12.2%	2.5%	-27.3%	0.0%	-7.0%	0.1%	8.7%	72.4%	-7.2%
2/80	64244	32204	96	155	4838	140	600	36	0	4888	4702	11219	106	123308
2/79	75760	37798	14	184	5707	121	465	48	0	5572	4779	12985	-17	143415
	-15.2%	-14.8%	585.7%	-15.8%	-15.2%	15.7%	29.0%	-25.0%	0.0%	-12.3%	0.1%	-13.6%	723.5%	-14.0%
3/80	58670	25667	144	160	5279	155	550	29	0	4873	4378	9503	520	109918
3/79	50057	22750	60	143	6329	128	525	28	0	4806	4366	8064	348	97603
	17.2%	12.8%	140.0%	11.9%	-16.6%	21.1%	4.8%	3.6%	0.0%	1.4%	0.3%	17.8%	49.4%	12.6%
4/80	43900	31736	154	100	3925	155	660	28	0	4970	3177	181	38	89032
4/79	40421	28725	121	26	5939	125	586	21	0	5666	3175	53	943	85800
	8.6%	10.5%	27.3%	284.6%	-33.9%	24.0%	12.6%	33.3%	0.0%	-12.1%	0.1%	241.5%	-96.0%	3.8%
SUMMER TOTAL														
	192970	150831	915	510	31589	1033	3850	116	0	34162	14893	1099	138	432107
	176884	132756	862	436	38663	416	3764	80	251	37637	14808	908	580	408117
	9.1%	13.6%	6.1%	17.0%	-18.3%	148.3%	2.3%	45.0%	-100.0%	-9.2%	0.6%	21.0%	-76.2%	5.9%
WINTER TOTAL														
	315527	130273	498	810	25646	758	2970	182	0	24456	22683	69035	547	593423
	308407	137123	181	826	30038	647	2666	195	0	27699	22279	63099	1508	594665
	2.3%	-5.0%	175.1%	-1.9%	-14.6%	17.2%	11.4%	-6.7%	0.0%	-11.7%	1.8%	9.4%	-63.7%	-.2%
YEAR TOTAL														
	508497	281104	1413	1320	57235	1791	6820	298	0	58618	37576	70134	685	1025530
	485291	269879	1043	1262	68701	1063	6430	275	251	65336	37087	64007	2088	1002782
	4.8%	4.2%	35.5%	4.6%	-16.7%	68.5%	6.1%	8.4%	-100.0%	-10.3%	1.3%	9.6%	-67.2%	2.3%

—NOTE: (1) WINTER TOTAL IS A SUM OF THE VALUES IN NOVEMBER, DECEMBER, JANUARY, FEBRUARY, AND MARCH.

(2) 999.9% REPRESENTS AN INFINITE PERCENTAGE CHANGE RESULTING FROM AN INCREASE FROM A ZERO VALUE TO SOME NON-ZERO VALUE AND THUS A DIVISION BY ZERO.

Table A-2 Comparison Between One Year of Actual and Forecast Demand for Eight Major Ohio Gas Utilities by Sector

(MMCF)

MONTH/YEAR	DEGREE DAYS	RESIDENTIAL REQUIREMENT	COMMERCIAL REQUIREMENT	INDUSTRIAL REQUIREMENT	OTHER REQUIREMENT	STORAGE (IN)	TOTAL REQUIREMENT	DEFICIENCY
5/79	202	23079	9662	27542	-5192	2244	67534	-767
5/78	455	26592	10101	24149	-8948	11176	63070	0
	-55.6%	-13.2%	-4.3%	14.1%	42.0%	-79.9%	7.1%	999.9%
6/79	30	12936	5839	25993	-2960	2135	53644	6
6/78	196	12490	5219	22036	-2700	10551	47596	0
	-84.7%	3.6%	11.9%	18.0%	-9.6%	-79.8%	12.7%	999.9%
7/79	5	8786	4424	23874	-265	2379	48798	690
7/78	29	9689	4169	19766	-678	10392	43337	0
	-82.8%	-7.3%	6.1%	20.8%	60.9%	-77.1%	12.6%	999.9%
8/79	11	8593	4284	24239	1463	1883	49163	1162
8/78	5	8510	4197	22592	2484	10924	48707	0
	120.0%	1.0%	2.1%	7.3%	-41.1%	-82.8%	0.9%	999.9%
9/79	87	9912	4652	25468	4414	1605	54352	1649
9/78	11	8575	4168	22862	2014	10372	47993	0
	690.9%	15.6%	11.6%	11.4%	119.0%	-84.5%	13.2%	999.9%
10/79	334	17400	7284	27185	11279	384	70347	-1977
10/78	87	17461	7296	26497	13246	7114	71614	0
	283.9%	-0.3%	-0.2%	2.6%	-14.8%	-94.6%	-1.8%	999.9%
11/79	690	32915	13303	30501	13727	0	90446	-2859
11/78	334	29993	12578	28300	13302	119	84291	0
	106.6%	9.7%	5.8%	7.8%	5.2%	-100.0%	7.3%	999.9%
12/79	1052	53246	21116	32088	12951	0	120378	-5660
12/78	686	50474	20755	30658	15106	12	117006	-610
	53.4%	5.5%	1.7%	7.3%	-14.3%	-100.0%	2.9%	-827.9%
1/80	1141	64973	26133	36054	7795	1326	136280	-4574
1/79	1028	71465	28932	35282	15302	760	151740	0
	11.0%	-9.1%	-9.7%	2.2%	-49.1%	74.5%	-10.2%	999.9%
2/80	980	62596	25130	34671	-5673	1326	118050	-5258
2/79	1124	75915	31099	36007	-859	1253	143415	0
	-12.8%	-17.5%	-19.2%	-3.7%	-560.4%	5.8%	-17.7%	999.9%
3/80	823	56109	22569	33254	-6282	0	105650	-4268
3/79	977	56373	22659	32484	-2671	194	97603	0
	-15.8%	-0.5%	-0.3%	2.4%	-135.2%	-100.0%	8.2%	999.9%
4/80	735	38891	15694	31368	-9277	9022	85698	-3334
4/79	814	39216	15873	29067	-7181	6826	85800	0
	-9.7%	-0.8%	-1.1%	7.9%	-29.2%	2.2%	-0.1%	999.9%
SUMMER TOTAL	1404	119797	51839	185669	-936	19652	429536	-2571
	1597	122533	51023	166969	-1761	69355	408117	0
	-12.1%	-2.2%	1.6%	11.2%	69.6%	-71.7%	5.2%	999.9%
WINTER TOTAL	4686	269839	108251	147368	22518	2652	570804	-22619
	4149	284220	116003	142731	40180	2338	594055	-610
	12.9%	-5.1%	-6.7%	2.8%	-44.0%	13.4%	-3.9%	3608.3%
YEAR TOTAL	6090	389636	160090	353037	21982	22304	1000340	-25190
	5746	406753	167026	329700	38419	71693	1002172	-610
	6.0%	-4.2%	-4.2%	7.1%	-42.8%	-68.9%	-0.2%	4029.5%

—NOTE: (1) WINTER TOTAL IS A SUM OF THE VALUES IN NOVEMBER, DECEMBER, JANUARY, FEBRUARY, AND MARCH

(2) 999.9% REPRESENTS AN INFINITE PERCENTAGE CHANGE RESULTING FROM AN INCREASE FROM A ZERO VALUE TO SOME NON-ZERO VALUE AND THUS A DIVISION BY ZERO.

(3) A POSITIVE DEFICIENCY INDICATES SHORTAGE, A NEGATIVE DEFICIENCY INDICATES SURPLUS.

Table A-3 Major Ohio Utilities - Net Generation by Type of Fuel
(Ohio Portion)
(Thousand MWH)

Mo/Yr	Coal		Oil		Gas	Nuclear		Total
1978								
JAN	8,565	(91%)	545	(6%)	4	262	(3%)	9,376
FEB	6,807	(89%)	528	(7%)	2	331	(4%)	7,668
MAR	7,034	(88%)	565	(7%)	4	369	(5%)	7,972
APR	7,476	(98%)	184	(2%)	7	0		7,937
MAY	8,933	(99%)	108	(1%)	6	0		9,047
JUN	9,323	(98%)	171	(2%)	8	0		9,502
JUL	8,928	(99%)	75	(1%)	18	0		9,021
AUG	9,889	(97%)	149	(2%)	9	137	(1%)	10,184
SEPT	8,874	(96%)	115	(1%)	10	235	(3%)	9,234
OCT	8,124	(98%)	69	(1%)	8	104	(1%)	8,305
NOV	8,582	(94%)	75	(1%)	7	429	(5%)	9,093
DEC	9,387	(96%)	171	(2%)	6	184	(2%)	9,747
TOTAL	102,192	(95.4%)	2,755	(2.6%)	89	2,051	(2%)	107,087
1979								
JAN	10,092	(95%)	296	(3%)	9	260	(2%)	10,660
FEB	9,042	(92%)	315	(3%)	10	458	(5%)	9,825
MAR	9,263	(93%)	167	(2%)	6	505	(5%)	9,940
APR	8,965	(99%)	87	(1%)	5	0		9,057
MAY	9,016	(99%)	94	(1%)	8	0		9,118

Source: Ohio Electric Utilities FPC Form 4 and the Ohio Department of Energy.

Table A-4 Ohio Electric Utilities Projected Demand and Fuel Assesment
November 1979 - March 1980

	November	December	January	February	March
Demand Forecast (Thousand MWH)	9,971.6	10,838.3	11,404.3	10,035.4	10,281.1
Proj. Daily Consumption					
Coal (Thousand tons)	163.7	167.6	173.2	168.7	155.6
Oil (Thousand Barrels)	12.7	13.1	26.0	25.6	23.5
Coal Deliveries (Thousand Tons)	4,885.6	4,860.3	5,257.8	4,957.9	5,054.6
Oil Deliveries (Thousand Barrels)	691.2	564.7	777.3	525.4	669.0

Note: Includes figures for seven investor-owned utilities (excludes Monongahela Power Co.).

Source: An Assessment of the Supplies of Natural Gas and Fuels for Generating Electricity in Ohio from July, 1979 - June 1980, Ohio Department of Energy, August 15, 1979.

Table A-5 Domestic Distillate Stocks
and Refinery Capacity Utilization

Week Ended	Distillate Stocks (1000 Bbls.) 1979	Distillate Stocks (1000 Bbls.) 1978	Refinery Capacity Utilization (Percentage) 1979	Refinery Capacity Utilization (Percentage) 1978
1-05	219,108	242,278	89.6	87.7
1-12	204,711	236,434	88.0	86.9
1-19	194,826	227,736	89.1	85.8
1-26	185,824	219,773	87.9	84.5
2-02	178,549	212,069	88.1	81.5
2-09	167,993	201,756	84.8	83.1
2-16	153,313	190,356	85.1	84.0
2-23	142,192	179,418	83.5	85.7
3-02	128,425	167,504	84.7	84.7
3-09	123,402	160,778	84.0	84.8
3-16	119,311	152,341	85.4	86.2
3-23	116,376	147,323	84.4	83.9
3-30	114,977	140,387	83.5	84.5
4-06	113,908	137,564	81.5	83.1
4-13	112,490	137,174	84.8	83.4
4-20	114,442	137,627	87.6	82.8
4-27	115,460	137,375	85.5	83.6
5-04	117,149	136,843	83.6	85.5
5-11	115,843	138,205	84.0	87.6
5-18	118,356	138,644	83.3	89.3
5-25	121,808	140,952	83.5	90.5
6-01	125,642	148,097	86.2	90.1
6-08	129,837	151,977	84.6	89.1
6-22	135,403	156,156	86.8	87.5
6-29	141,686	157,275	89.4	87.3
7-06	147,704	163,107	90.0	88.6
7-13	150,270	169,777	86.6	91.9

Source: A.P.I. Weekly Statistical Bulletin.

Figure 1. Petroleum Administration for Defense (PAD) Districts

Table A-6 Projected Distillate Fuel Stocks, for New England, P.A.D. 2, & U.S., August 18 - October 26, 1979 (1000 Bbls.)

Week Ended	New Eng.	PAD 2	U. S.
August 24	18,188	54,111	189,376
% Difference 1978	22.5	-13.3	-1.6
August 31	19,738	56,093	196,209
% Difference 1978	33.1	-12.1	1.0
September 7	21,419	58,146	203,290
% Difference 1978	42.4	-10.0	1.7
September 14	23,244	60,275	210,626
% Difference 1978	48.4	-7.5	3.0
September 21	25,225	62,482	218,226
% Difference 1978	59.1	-5.7	5.4
September 28	27,374	64,770	226,101
% Difference 1978	65.3	-1.8	7.2
October 5	29,706	67,142	234,260
% Difference 1978	83.7	-1.0	7.7
October 12	32,227	69,600	242,713
% Difference 1978	86.6	2.8	12.7
October 19	34,984	72,149	251,472
% Difference 1978	108.7	10.8	17.0
October 26	37,964	74,790	260,546
% Difference 1978	124.0	16.8	20.8

Source: A.P.I. Weekly Statistical Bulletin.

Table A-7 Distillate Fuel Oil Stocks, 1979 vs. 1978
(1000 bbls.)

	PAD 2		Total U.S.	
	1979	1978	1979	1978
JUN 8	36,433	49,226	128,225	150,412
15	NA	49,400	NA	151,977
22	38,285	52,148	135,403	156,156
29	39,576	52,148	141,686	157,275
JUL 6	40,949	53,026	147,704	163,107
13	43,459	55,912	150,270	169,777
20	NA	56,133	NA	174,444
27	NA	57,463	164,910	177,897
AUG 3	49,595	59,319	169,960	180,787
10	50,296	60,269	175,294	184,737
17	52,200	61,022	182,780	188,253
24		62,377		192,507
31		63,817		194,815
SEP 7		64,636		199,813
14		65,131		204,567
21		66,271		207,121
28		65,940		210,920
OCT 5		67,537		217,570
12		67,719		215,317
19		65,133		214,902
26		64,031		215,615

Source: A.P.I. Weekly Statistical Bulletin.

Table A-8 PAD District Share of Total Distillate Fuel Stocks, Actual and Projected, June - October 1979

Week Ended	New Eng.	PAD 1	PAD 2	PAD 3	PAD 4	PAD 5
June 8	5.8%	39.7%	28.4%	22.0%	2.3%	7.6%
July 6	6.8%	41.6%	27.7%	21.8%	1.9%	7.2%
Aug. 3	8.2%	43.3%	29.2%	18.6%	2.1%	6.9%
Sept. 7*	10.5%		28.6%			
Oct. 5*	12.7%		28.7%			

*Based on projected fuel stocks (Table A-6)

Source: A.P.I. Weekly Statistical Bulletin.

Table B-1 Coal Reserves in Appalachian States

State	Total Identified Reserves (in millions of short tons)	BTU Equivalents in Quadrillions(10^{15})
West Virginia	100,150	2,503.750
Pennsylvania	82,752	2,068.800
Kentucky	64,346	1,608.650
OHIO	49,063	1,226.575
Alabama	15,262	381.550
Virginia	9,551	238.755
Tennessee	2,530	63.250
Maryland	1,152	28.800
North Carolina	110	2.750
Georgia	24	0.600
Total	324,940	8,123.500

Note: Identified resources are as of January 1, 1974, except Ohio. Ohio resources are as of January 1, 1979.

Source: Coal Data 1976 and the Ohio Department of Energy.

Table B-2A Ohio Energy Consumption By Fuel, Residential Sector

	1972		1973		1974		1975		1976		1977		1978	
	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu
Distillate/Kerosene (Million Barrels)	15.26	88.13	15.13	87.36	14.05	81.23	14.01	81.02	18.21	105.31	18.46	106.76	18.60	107.53
% of total		12%		13%		12%		12%		15%		16%		16%(e)
LPG (Million Barrels)	4.97	19.95	5.07	20.32	4.98	19.98	5.16	20.71	5.31	21.29	5.00	20.05	4.72	18.93
% of total		03%		03%		03%		03%		03%		03%		03%(e)
—Petroleum-Total	20.23	108.08	20.20	107.68	19.03	101.21	19.17	101.73	23.52	126.60	23.46	126.81	23.32	126.46
% of total		15%		16%		15%		16%		18%		19%		19%(e)
Coal (Million Tons)	0.84	23.36	0.73	21.06	0.76	21.30	0.50	13.14	0.46	12.08	0.40	10.50	.37	9.69
% of total		03%		03%		03%		02%		02%		02%		01%(e)
Natural Gas (Billion Cubic Feet)	478.33	493.64	439.21	453.27	435.80	449.74	427.82	441.50	440.19	464.55	411.93	434.73	412.12	434.93
% of total		70%		68%		68%		68%		66%		64%		65%(e)
Electric (Billion Kwh)	23.93	81.66	26.03	88.83	26.72	91.16	28.02	95.60	28.95	98.77	31.03	105.87	29.43	100.42
% of total		12%		13%		14%		15%		14%		16%		15%(e)
Total	-----	706.74	-----	670.84	-----	663.41	-----	651.97	-----	702.00	-----	677.91	-----	671.50

Note: All percentages are rounded to the nearest whole number. All 1976 and 1977 Btu's and all 1978 physical units are converted figures.

Source: Federal Energy Data System, U.S. Department of Energy

Revised: October 10, 1979

Table B-20 Ohio Energy Consumption by Fuel, Commercial Sector

	1972		1973		1974		1975		1976		1977		1978	
	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu
Distillate (Million Barrels)	4.83	28.16	4.84	28.19	4.71	27.41	4.85	28.23	6.23	36.26	6.28	36.55	6.20	36.11
% of total		8%		9%		8%		9%		11%		12%		11%(e)
Gasoline (Million Barrels)	.74	3.88	.83	4.38	.83	4.34	1.13	5.95	1.07	5.61	.91	4.77	1.25	6.56
% of total		1%		1%		1%		2%		2%		2%		2%(e)
LPG (Million Barrels)	.55	2.23	.56	2.26	.55	2.22	.57	2.30	.59	2.36	.56	2.23	.52	2.10
% of total		1%		1%		1%		1%		1%		1%		1%(e)
Residual(Million Barrels	.83	5.22	.69	4.36	1.23	7.74	3.06	19.25	3.45	21.70	3.61	22.71	3.62	22.76
% of total		2%		1%		2%		6%		6%		7%		8%(e)
—Petroleum-Total	6.95	39.49	6.93	39.19	7.32	41.71	9.62	55.73	11.34	65.93	11.35	66.26	11.59	67.53
% of total		12%		12%		13%		18%		20%		21%		21%(e)
Coal (Million tons)	.46	12.71	.40	1.47	.41	11.56	.27	7.61	.25	7.50	.22	6.20	.21	6.00
% of total		4%		4%		4%		2%		2%		2%		2%(e)
Natural Gas (Billion Cubic Feet	208.07	214.73	196.66	202.96	192.50	198.66	169.36	174.78	179.39	185.13	149.01	153.78	169.04	174.49
% of total		64%		62%		61%		56%		55%		50%		54%(e)
Electric (Billion kWh)	19.67	67.11	21.36	72.88	21.39	72.98	22.38	76.38	23.10	78.84	24.24	82.73	21.28	72.63 (e)
% of total		20%		22%		22%		24%		23%		27%		23%(e)
Total	------	334.04	------	326.50	------	324.91	------	314.50	------	336.95	------	3808.97	------	320.61 (e)

Note: Asphalt and road oil are excluded from petroleum total. All percentages are rounded to the nearest whole number. All 1976 and 1977 Btu and all 1978 physical units are converted figures. Estimates (e) prepared by the Ohio Department of Energy.

Source: Federal Energy Data System, U.S. Department of Energy.

Revised: October 10, 1979

Table B-2C Ohio Energy Consumption by Fuel, Industrial Sector

	1972		1973		1974		1975		1976		1977		1978	
	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu
Diesel Fuel (Million Barrels)	2.05	11.92	2.34	13.62	1.68	9.76	2.04	11.89	2.80	16.32	1.95	11.37	2.23	13.03
% of total		1%		1%		1%		1%		1%		1%		1%(e)
Distillate (Million Barrels)	5.54	32.26	4.64	27.01	6.24	36.37	5.89	34.30	7.48	43.56	9.39	54.68	11.31	65.85
% of total		2%		2%		3%		3%		3%		4%		5%(e)
Gasoline (Million Barrels)	1.52	7.98	1.46	7.64	1.55	8.11	1.35	7.08	1.22	6.04	1.12	5.89	1.45	7.64
% of total		1%		1%		1%		1%		1%		0%		1%(e)
LPG (Million Barrels)	1.55	6.23	1.50	6.00	1.56	6.26	1.36	5.45	1.87	7.49	2.28	9.16	2.29	9.20
% of total		0%		0%		0%		0%		0%		1%		1%(e)
Residual (Million Barrels)	3.98	25.03	4.55	28.58	4.32	27.19	5.67	35.68	6.41	40.34	7.92	49.84	7.90	49.73
% of total		2%		2%		2%		3%		3%		4%		4%(e)
— Petroleum-Total	14.64	83.42	14.48	96.47	15.35	87.69	16.31	94.40	19.78	114.11	22.67	130.94	25.19	145.45
% of total		6%		7%		6%		8%		9%		11%		12%(e)
Coal	------	677.51	------	648.00	------	680.90	------	572.83	------	539.29	------	598.06	------	599.78
% of total		48%		46%		48%		47%		43%		48%		48%(e)
Natural Gas (Billion Cubic Feet)	443.32	457.51	451.88	466.34	443.33	457.52	352.91	364.20	373.43	385.38	285.13	294.25	311.84	321.81
% of total		33%		33%		32%		30%		31%		24%		26%(e)
Electric (Billion kWh)	53.24	181.65	59.05	201.48	57.56	196.39	54.07	184.50	60.71	207.15	65.38	223.08	55.77	190.28
% of total		13%		14%		14%		15%		17%		18%		15%(e)
Total	------	1,400.09	------	1,398.67	------	1,422.50	------	1,215.93	------	1,245.93	------	1,246.33	------	1,257.32

Note: Electric utility consumption of coal is not included; however, coking coal and petrocoke are included in coal total. This results in incompatible physical units. Feedstocks are not included in total petroleum consumption. All percentages are rounded to the nearest whole number. All 1976 and 1977 Btu and all 1978 physical units are converted figures. Estimates (e) prepared by the Ohio Department of Energy.

Source: Federal Energy Data System, U.S. Department of Energy.

Revised: October 10, 1979

Table B-20 Ohio Energy Consumed by Fuel, Transportation Sector

	1972		1973		1974		1975		1976		1977		1978	
	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu	Physical Units	Trillion Btu
Distillate/Diesel (Million Barrels)	16.13	93.97	17.20	100.22	14.91	86.84	16.46	95.91	17.96	104.65	17.03	99.23	17.65	102.86
% of Total		13%		13%		12%		13%		13%		12%		13%(e)
Gasoline (Million Barrels)	113.6	596.41	119.0	624.99	114.66	601.74	116.63	612.09	121.03	635.17	125.40	652.07	126.94	666.17
% of total		80%		81%		82%		81%		81%		82%		82%(e)
Jet Fuel (Million	6.65	36.61	6.66	36.70	5.65	31.10	5.95	32.73	5.66	31.14	6.06	33.32	6.07	33.41
% of total		5%		5%		4%		4%		4%		4%		4%(3)
LPG (Million Barrels)	.07	.30	.07	.35	.06	.35	.06	.28	.08	.37	.09	.40	.11	.52
% of Total		0%		0%		0%		0%		0%		0%		0%(e)
Residual	.20	1.28	.10	.61	.33	2.06	.61	3.83	.93	5.84	.64	4.02	.67	4.21
% of total		0%		0%		0%		1%		1%		1%		1%(e)
--Petroleum-Total	136.70	728.57	143.12	762.87	135.61	722.09	139.71	744.85	145.66	777.17	149.21	795.04	151.44	807.17
% of total		98%		98%		99%		99%		99%		99%		99%
Natural Gas (Billion Cubic Feet)	12.73	13.13	12.80	13.21	10.02	10.34	9.03	9.31	7.72	7.96	8.05	9.30	8.27	8.53
% of Total		2%		2%		1%		1%		1%		1%		1%(e)
Electric (Billion kWh)	.04	.15	.04	.13	.04	.13	.04	.14	.04	.14	.04	.14	------	------
% of total		0%		0%		0%								
Total	------	741.85	------	776.21	------	732.56	------	754.29	------	785.27	------	803.48	------	815.70

Note: All percentages are rounded to the nearest whole number. All 1976 and 1977 Btu and all 1978 physical units are converted figures. Estimates (e) prepared by the Ohio Department of Energy.

Source: Federal Energy Data System, U.S. Department of Energy.

Revised: October 10, 1979

Table B-3 Ohio Coal Use by Source, 1970 - 1978
(Thousand Short Tons)

Year	Total Exports	Western Coal	Eastern Coal*	Total Imports	Ohio Coal	Total Use
1970	19,584	-0-	31,822	31,822	35,553	67,375
1971	15,414	-0-	29,513	29,513	33,603	63,116
1972	15,422	-0-	32,665	32,665	35,130	67,795
1973	12,257	-0-	32,348	32,348	33,409	65,557
1974	12,308	1,172	35,426	36,598	33,044	69,642
1975	13,205	1,433	33,118	34,551	33,468	68,019
1976	11,403	3,372	32,191	35,563	35,401	70,904
1977	10,700	4,841	33,051	37,892	36,240	74,132
1978	8,133	4,700	32,504	37,204	30,707	67,912

*Excludes Ohio

Note: Eastern Region includes Bituminous Coal and Lignite Producing Districts 1 - 13. Western region includes all other states except Ohio.

Source Energy Data Report, Bituminous Coal and Lignite Distribution, U.S. Department of Energy.

Table B-4 Ohio Gross Energy Production by Fuel, 1970 - 1978

Year	Crude Oil (Thousand Bbls.)	Natural Gas (MMcf)	Coal (Thousand Short Tons)
1970	9,864	73,759	55,137
1971	9,670	82,678	49,017
1972	9,358	90,487	50,572
1973	8,796	94,121	45,666
1974	9,088	94,376	45,352
1975	9,578	85,810	46,673
1976	9,994	89,770	46,804
1977	10,359	99,656	46,940
1978	11,154	115,239	38,840

Note: Natural gas production in 1978 includes an estimated 1,141 mmcf produced and sold but not reported and gas utilized in the field.

Source: Summary of Ohio Oil and Gas Developments in 1978, Ohio Department of Natural Resources; and Division of Mines Report, Ohio Department of Industrial Relations.

Table B-5 Ohio Gross Energy Consumption by Fuel, 1970 - 1978

	1970	1971	1972	1973	1974	1975	1976R	1977R	1978
Coal									
Million Short Tons	67.56	63.27	67.92	65.68	69.74	68.10	70.96	74.1	67.91
Trillion Btu	1,684.15	1,544.34	1,656.76	1,609.38	1,661.43	1,582.05	1,637	1,731	1,586.42
Percent of Total Gross Energy	43.0	40.4	40.6	39.8	41.2	41.3	40.38	42.50	38.64
Petroleum									
Million Barrels	210	210	224	233	225	227	247	265	268 C
Trillion Btu	1,160	1,150	1,230	1,280	1,230	1,250	1,357	1,455	1,469
Percent of Total Gross Energy	29.6	30.1	30.1	31.7	30.5	32.7	33.47	35.73	35.78
Natural Gas									
Billion cu. ft.	1,037.92	1,093.66	1,159.14	1,116.65	1,102.34	965.24	995.66	856	1,011.6 C
Trillion Btu	1,071.13	1,128.66	1,196.23	1,152.38	1,137.61	996.13	1,060	884.9	1,043
Percent of Total Gross Energy	27.4	29.5	29.3	28.5	28.2	26.0	26.15	21.73	25.40
Nuclear and Hydro									
Billion KWh	.01	.01	.01	.01	.01	.01	.01	.46	2.1 C
Trillion Btu	.08	.09	.09	.08	.10	.07	.09	1.6	7.1
Percent of Total Gross Energy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.17
Total Gross Energy Trillion Btu	3,915.36	3,823.00	4,083.03	4,041.8	4,029.14	3,828.25	4,054.09	4,072.5	4,105.52

Notes: R indicates revision; C indicates conversion from Btu to physical unit.
Figures include fuel used for the generation of electricity.

Source: Federal Energy Data System, U. S. Department of Energy and the Ohio Department of Energy.

Table B-6 New or Expanded Ohio Coal Mines 1978 - 1986
(Million Tons)

Company/Division	Mine Name & County Location	Deep (D) or Strip (S)	Use Stm (ST) or Gas (G)	1978	1979	1980	1981	1982	1983	1984	1985	1986
Consolidation Coal Co.	Noble County	S	G			2.50						
Empire Coal Co.	Empire-Tuscarawas	S	ST		0.06							
Horizon Coal Co.	Roseville-Muskingum	S	ST	0.05	0.15							
Quarto Mining Co.	Powhatan 4 - Monroe	D	ST	1.00	1.10							
Quarto Mining Co.	Powhatan 7 - Monroe	D	ST	1.00	1.00	0.90						
Quarto Mining Co.	Monroe County (2 mines)	D	ST		1.00	1.00	1.00	1.00	0.70			
Saginaw Mining Co.	Saginaw - Belmont	D	ST	0.20	0.20							
Southern Ohio Coal Co.	Meigs 1 - Meigs	D	ST	0.20	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Southern Ohio Coal Co.	Meigs 2 - Meigs	D	ST	0.20	0.10							
Southern Ohio Coal Co.	Raccoon 3 - Vinton	D	ST	0.40	0.20							
Youghiogheny & Ohio Coal Co.	Cadiz Portal - Harrison	D	ST	0.25	0.40	0.10						
Youghiogheny & Ohio Coal Co.	Nelms 2 - Harrison	D	ST	0.10	0.10	0.10	0.10					
Youghiogheny & Ohio Coal Co.	Allison - Belmont	D	ST	0.10	0.10	0.10	0.10	0.10				
Total Ohio				3.60	4.51	4.80	1.30	1.20	0.80	0.10	0.10	0.10

Source: Coal Age, February 1979, pp 106-107; McGraw-Hill.

Table B-7 Ohio Utility Long-Term Debt Ratings, 1969 - 1978

	1978	1977	1976	1975	1974
Cincinnati Gas and Electric	Aa	Aa	Aa	Aa	Aa
Cleveland Electric Illuminating	Aa	Aa	Aa	Aa	Aa
Columbus and Southern Ohio Electric	A	A	A	A	A
Dayton Power and Light	A	A	A	A	A
Ohio Edison	A	A	A	A	Aa
Ohio Power	Baa	Baa	Baa	Baa	Baa
Toledo Edison	Baa	Baa	Baa	Baa	Aa

	1973	1972	1971	1970	1969
Cincinnati Gas and Electric	Aaa	Aaa	Aaa	Aaa	Aaa
Cleveland Electric Illuminating	Aa	Aa	Aa	Aa	Aa
Columbus and Southern Ohio Electric	A	Aa	Aa	Aa	Aa
Dayton Power and Light	Aa	Aa	Aa	Aa	Aa
Ohio Edison	Aa	Aaa	Aaa	Aaa	Aaa
Ohio Power	Baa	A	A	A	Aa
Toledo Edison	Aa	Aa	Aa	Aa	Aa

Source: Moody's Public Utility Manual

Table B-8 Comparison of Utility Common Stock Prices
To Book Value Per Share, 1970 and 1978
(dollars)

Company	1970		1978	
	Book Value Per Share	Price Range	Book Value Per Share	Price Range
Cincinnati Gas & Electric	15.31	29.50 - 21.00	23.20	23.63 - 19.38
Cleveland Electric Ill.	14.37	26.38 - 18.63	23.60	23.13 - 16.63
Columbus & Southern Ohio	25.93	32.50 - 22.25	28.31	27.13 - 20.63
Dayton Power & Light	17.02	26.50 - 20.60	20.35	18.75 - 14.63
Ohio Edison	14.22	25.50 - 19.75	17.87	19.75 - 14.63
Toledo Electric	18.36	32.25 - 27.50	27.19	25.75 - 20.63
American Electric Power	16.80	32.00 - 22.00	24.25	24.75 - 20.75

Source: Moody's Handbook of Common Stocks, Summer 1979.

Table B-9 Bonds and Preferred Stocks as a Percentage of Long-Term Capital for Ohio Electric Utilities, 1970, 1971 - 1975

Company	Percent of Capital, 1970	Percent of Capital, 1971 - 1975
Cincinnati Gas & Electric	66.0	64.6
Cleveland Electric Illuminating	58.2	64.8
Columbus and Southern Ohio Electric	68.7	66.4
Dayton Power and Light	62.8	64.9
Ohio Edison	58.6	63.8
Ohio Power	67.9	69.1
Toledo Edison	67.1	68.0

Source: A Summary Financial Analysis, Ohio Electric Public Utilities, 1867 - 1975, William B. Brueggeman, Ph.D., January 1977.

Table B-10 Electric Generating Capacity Serving Ohio, 1975 - 1989
(Megawatts)

	1975	1976	1977	1978	1980	1985	1989
Coal	26,936	27,414	28,817	29,687	30,582	32,254	34,953
Oil & Gas (baseload)	1,084	645	650	633	620	569	569
Oil & Gas (peaking units)	1,401	1,794	1,857	1,843	1,843	2,825	3,125
Nuclear	0	133	960	1,186	2,014	4,661	6,418
Hydro, Pumped Storage	335	335	335	366	366	466	446
Total	29,756	30,321	32,619	33,715	35,425	40,755	45,511

Note: 1980, 1985, and 1989 figures include existing and projected capacity.

Source: Ohio Electric Utilities' Ten Year Forecasts.

Table B-11 New Ohio Electricity Generating Facilities Proposed Through 1989

Date	Company	Location	Size (Mw)	Type
1980	Cincinnati Gas & Electric	Moscow, Ohio	807	Nuclear
1980	Pennsylvania Power	Shippingport, Pennsylvania	825	Coal
1981	Cincinnati Gas & Electric	Kentucky	600	Coal
1981	Ohio Power	Racine, Ohio	40	Hydro
1982	Dayton Power & Light	Wrightsville, Ohio	600	Coal
1982	Columbus	Columbus, Ohio	90	Coal, Trash
1983	Cleveland Electric Illuminating	North Perry, Ohio	1205	Nuclear
1984	Cincinnati Gas & Electric	Kentucky	600	Coal
1984	Buckeye Power	?	500	Oil
1984	Columbus & Southern Ohio Electric	Groveport or Amlin, Ohio	280	Oil
1984	Duquesne Light	Shippingport, Pennsylvania	833	Nuclear
1985	Ohio Power	Eureka, Ohio	40	Hydro
1985	Buckeye Power	?	150	Oil
1985	Cleveland Electric Illuminating	North Perry, Ohio	1205	Nuclear
1986	Dayton Power & Light	Wrightsville, Ohio	600	Coal
1986	Buckeye Power	?	615	Coal
1987	Columbus & Southern Ohio Electric	Athens, Ohio	375	Coal
1988	Cincinnati Gas & Electric	Kentucky	700	Coal
1988	Toledo Edison	Port Clinton, Ohio	906	Nuclear
1989	Columbus & Southern Ohio Electric	Athens, Ohio	375	Coal
1989	Ohio Edison	Erie County, Ohio	1260	Nuclear

Source: Ohio Electric Utilities' Ten Year Forecasts.

Table B-12 Ohio Resource Reserves by Fuel, 1970 - 1978

Year	Crude Oil (1000 Bbls.)	Natural Gas (MMcf)	Coal (Million Short Tons)
1970	127,912	557,455	*
1971	129,144	615,477	*
1972	127,385	715,151	*
1973	124,911	808,641	*
1974	123,871	960,662	41,166
1975	121,263	969,020	41,119(e)
1976	125,268	1,025,950	41,073(e)
1977	129,148	1,093,150	41,028(e)
1978	131,648	1,177,000	49,063(e)

Note: The figure for 1978 natural gas is preliminary. Coal reserves are remaining identified resources; no data is available for years marked with asterisk (*). Coal reserve figures for 1975-1978 are ODOE estimates.

Source: Summary of Ohio Oil and Gas Developments in 1978, Ohio Department of Natural Resources; Coal Data 1976; and the Ohio Department of Energy.

Table B-13 Top Ranked Ohio Counties for New Gas/Oil Wells, 1978

Rank	County	1977 Number of Wells Drilled	1978 Number of Wells Drilled
1	Guernsey	130	255
2	Muskingum	189	235
3	Portage	119	216
4	Tuscarawas	236	189
5	Washington	180	181
6	Coshocton	245	163
7	Trumbull	114	140
8	Perry	132	111
9	Mahoning	114	101
All Others		1,165	1,015
Total		2,624	2,606

Source: Ohio Department of Natural Resources (Division of Oil & Gas).

Table B-14 Sources of Gas Supply for Ohio Gas Utilities, - 1978
(Annual Purchases in MMcf)

Company	Interstate	Ohio Production	Green Springs	Storage	Total
Cincinnati Gas & Electric	84,763	1,047	6,188	58	92,056
Columbia Gas of Ohio	318,463	4,174	23,897	2,625	349,159
Dayton Power & Light	62,256	---	4,170	530	66,956
East Ohio Gas	333,378	49,591	---	59,968	442,937
National Gas & Oil	7,539	5,452	---	1,545	14,536
Ohio Gas	6,247	117	---	201	6,565
River Gas	3,937	1,362	---	---	5,299
West Ohio	14,762	---	927	255	15,944
Total	831,345	63,743(1)	35,182	65,182	993,452
Percentage of Total	79.2%	6.1%	3.4%	6.2%	94.7%(2)

Note: (1) In addition, approximately 54,000 MMcf (5.1% of total usage) was sold directly to industrial users through the State's self-help natural gas program. (2) Utility supplies account for 94.7% of total natural gas used in Ohio.

Source: Monthly reports of eight major Ohio gas utilities.

Table B-15 Average U. S. Gasoline Prices, 1973 - 1979
(cents/gallon)

Year	Leaded Regular Full Serve	Leaded Regular Self Serve	Unleaded Regular Full Serve	Unleaded Regular Self Serve
1973	39.0	NA	NA	NA
1974	52.8	NA	NA	NA
1975	56.2	55.1	59.8	NA
1976	58.7	55.4	62.5	NA
1977	62.6	58.2	66.4	63.6
1978	63.9	59.8	68.4	64.9
1979	72.5	68.7	77.4	73.8

Note: Prices include taxes. Prices for 1979 are as of March.

Source: Monthly Energy Review and Energy Data Report, Gasoline Prices, U. S. Department of Energy.

Table B-16 Average Residential and Industrial Heating Oil Prices, 1974 - 1979
(cents/gallon and cents/MBtu)

	United States				East North Central Census Region/DOE Region 5			
	Residential		Industrial		Residential		Industrial	
Year	cents/gal.	cents/MBtu	cents/gal.	cents/MBtu	cents/gal.	cents/MBtu	cents/gal.	cents/MBtu
1974	34.7	250.2	33.1	238.7	33.9	244.4	32.5	234.3
1975	37.7	271.8	NA	NA	35.7	257.4	NA	NA
1976	40.6	292.7	NA	NA	38.4	276.9	NA	NA
1977	46.0	331.7	38.9	280.5	44.8	323.0	38.3	276.2
1978	49.4	356.2	39.8	287.0	47.0	338.9	38.8	279.8
1979	58.7	423.2	48.2	347.5	56.3	405.9	47.5	342.5

Note: Residential regional prices for 1974-1977 are for the East North Central Census Region. Prices for 1979 are as of March. Industrial region prices for 1974 are for East North Central Census Region; industrial regional prices for 1976 are for the North Central Region. All regional prices for 1978-1979 are for DOE Region 5.

Source: Monthly Energy Review and Energy Data Report, Heating Oil Prices and Margins, U. S. Department of Energy; Cost of Living Council Form 92; and FEA Form P112.

Table B-17 Ratio of Gross State Product to Ohio Energy Use, 1970 and 1978 (1972 Dollars/Btu x 109)

	1970	1978
GSP/Total Ohio Energy Use	14,475.94	17,555.88
GSP/Industrial, Commercial,& Non-Gasoline Transportation Use	27,132.84	48,756.52

Source: Ohio Department of Economic and Community Development and Federal Energy Data System, U. S. Department of Energy.

SECTION IV

A-95 Review & Comments

A-95 REVIEW AND COMMENTS

Prior to submission of an Annual Energy Status Report, Section 1551.04 (F) ORC requires ODOE to circulate the report to the various local and regional Ohio "A-95" governmental agencies for their review and comment. Below are the Director's comments on the concerns expressed in the A-95 review process.

Several commenters expressed the view that consumers must pay for the "hidden costs" of sulfur emissions pollution. The coal portion of Section II as submitted does address this point in discussing a variety of related air quality issues. ODOE believes that the specific health effect accruing from incremental levels of sulfur emission is not yet known. Therefore, ODOE believes that stringent, inflexible emission regulations are not appropriate. This is particularly so since it is not known whether the compliance costs passed on by Ohio coal users to their customers is commensurate with such consumer "hidden costs."

Current federal sulfur emission regulations err on the stringent side, and ignore the effects of increased cost, which are detrimental to employment, contribute to a greater rate of inflation, and a reduction of energy supply. While ODOE does not support dirty air quality standards, we do believe current air quality regulations are overly restrictive and can be improved. Uniform inflexible nationwide regulatory standards make little sense today. Flexible standards and regulations can be designed which avoid imposing regionally or locally severe, irreversible and unnecessary compliance costs. More must be known about the relationship between emission and harmful health effects. Then the necessary abatement costs and benefits can be better quantified. Subsequent regulation can more assuredly justify, impose, and apportion those costs.

Commenters were also concerned that the Department should coordinate transportation conservation efforts with the Ohio Department of Transportation (ODOT) and that the report be more consumer-oriented. ODOE is currently coordinating efforts with ODOT. We have been working jointly on various ride-sharing and public transit programs. The Ohio Revised Code does not intend that the Annual Energy Status Report be consumer oriented. Rather, it specifies that we report on current Ohio energy trends to the Governor and General Assembly. In this report ODOE has attempted to delineate energy problems and subsequent policy directions clearly and succinctly. Consumers will surely be able to glean useful information from the report. However, this is not the prime purpose of the report. ODOE will continue to provide other consumer-oriented publications to Ohioans. There are other means through which consumers can gain access to energy information. For

example our toll free "Hot Line" has responded to thousands of Ohio consumer inquiries. We will continue to provide this service.

One commenter asked whether the status of fuel allocation plans adopted under Ohio Revised Code 1551.08 should be mentioned in the Status Report. We have not addressed such contingency plans in this report, because we do not expect any severe supply interruptions to occur in the near future. It should be noted that ODOE Allocation and Emergency Rules were adopted and filed with the Secretary of State in June, 1978 as required by Ohio Revised Code. This was noted in our 1978 Report. These rules are available for gubernatorial consideration of appropriate actions should an energy emergency occur.

One commenter suggested that more emphasis be placed on electricity conservation to "forestall the need for generating any more electricity than necessary" and thereby to reduce air pollution loadings. The Electricity portion of Section II as submitted does place additional emphasis on reducing the need for future generating plant and encouraging electricity conservation. ODOE electricity policy directions are aimed at assuring adequate electricity supplies to Ohio consumers, not at reducing air pollution. However, this is an excellent comment and ODOE shall continue to emphasize this important matter.

One commenter asked if sufficient efforts are being made to increase efficiency of energy usage in public buildings. ODOE coordinates Ohio's energy audits and technical assistance program under Title III of the National Energy Conservation Policy Act. This program provides partial funding for increasingly detailed energy audits for local government and public buildings, as well as hospitals, schools, and universities. This program will make almost $50 million available for energy saving capital improvements in Ohio's public buildings. This will result in substantial energy and tax dollar savings.

Finally, one commenter asked whether unused small electric generators have been surveyed and whether possibilities for mandating utility companies to accept excess user-generated solar and wind generated power have been explored. ODOE has not surveyed unused small generators because the small generators are generally used for peak sharing and their operation precludes the efficient use of energy. Economic considerations limit useable abandoned generators to conventional hydropower units. Most available hydroelectric generation sites in Ohio are already developed. ODOE is, however, currently researching application of "low head" dam hydro-generation applicability to additional Ohio sites. Therefore, there is little point in surveying the availibility of such small generators until a more efficient use for them is identified. Individual users will make their own decisions on whether unused generators can be useful to them for on-site user generated and consumed power.

The Public Utilities Regulatory Policy Act passed by Congress in October, 1978 requires that utilities purchase excess solar and wind generated power at reasonable rates. PUCO will determine how this is to be done. ODOE will, of course, offer an energy supply perspective to these determinations.